which are, on two sides, older leaves, and on the other two, thin layers of gum. As an instance of the third case the orthotropic position of folded palm-leaves is mentioned. It would scarcely seem permissible to put forward a case like this as an instance of special adaptation, for, as is well known, it is generally true that rolled-up dorsiventral organs are inclined to take the erect position. Undoubtedly, nevertheless, such a position is of decided value to the young leaves and parts of leaves for it clearly serves to put them in the least exposed position with reference to the incident rays of a hot tropical sun. Many examples of this manner of protection may be found among the monocotyledons in particular. The last method of protection is a favorite one and is by no means confined to plants growing in the tropics. Uvaria, Gossypium and Begonia are the examples cited by Potter. In each of these genera when a leaf has become old enough to resist the hot rays of the sun and the unfavorable conditions of the atmosphere it is quite natural that it should be utilised as a protecting shield for the immature leaves which are less able to withstand conditions varying so widely from the optimum.

Some good figures are given in the plates which accompany the article, and, with the exception of the third, each class is illustrated.—CONWAY MACMILLAN.

Vitality of ferns.

Wittrock publishes in a recent paper[1] a series of observations, which form together a very valuable contribution to the biology of the ferns. It deals especially with the ability of fern-leaves to imbibe water and to become fresh after a long period. Several species are described as showing this power and the author has observed that a special form of the frond is characteristic of each species, when naturally dried. Most interesting, however, is the chapter in which the author demonstrates the ability of the ferns to be revivified after being kept dry for several months or even years and after being preserved as herbarium specimens! Professor Wittrock has taken, for instance, several species from the Pringle-collections immersed them in water for some minutes and then planted them in moist sandy soil, keeping them carefully in shade and under an ordinary glass globe. The ferns became perfectly

[1] V. B. WITTROCK: De filicibus observationes biologicae. Acta horti Bergini, vol. 1. no. 8. Stockholm, 1891.

fresh and developed new leaves and roots, although some had been preserved in herbaria for two years and three months. The Mexican plants which Prof. Wittrock succeeded in reviving were: *Scolopendrium nigripes; Asplenium furcatum, A. Pringlei; Polypodium Plumula, P. lanceolatum; Cheilanthes lendigera, C. Szovitsii; Isoetes Pringlei. Selaginella lepidophylla*, the well-known resurrection-plant, was also cultivated, and specimens which had been kept dry in a jar for more than eleven years revived. The paper is illustrated by five partly colored plates.—THEO. HOLM.

Anatomy of carices.

A very comprehensive study of the anatomical structure of about fifty species of *Carex* has been made by M. Mazel, forming a very welcome addition to the papers which deal with anatomical characters of species. Although the author admits that he has not succeeded in finding any characters in this genus sufficient to characterize the different groups of species, he has at least made a beginning by enumerating a considerable number of peculiarities in the internal structure which undoubtedly may serve in the future as a basis for a more complete study of this genus. It seems, however, that the species selected for examination are not quite sufficient to illustrate the whole genus anatomically. For it must be remembered that we have here to do with an exceedingly large genus, of which the representatives are spread all over the world and living under the most different conditions as to climate and soil. This has not been taken into consideration, and instead of selecting about fifty species, all European excepting one, it would have been more advisable to examine the same number representing other parts of the world. North America posesses very many and most interesting species of *Carex*, which ought not to have been passed by in a "comparative" anatomical study. The Arctic region also has a considerable number of types, many of which appear again farther south, and of which the structure is better suited to illustrate the genus anatomically than a number of species from a relatively small territory. It would also have been highly desirable for the author to give a sketch of the modified structure in the varieties of a few species. This is for in-

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ANTOINE MAZEL: Etudes d'anatomie compareé sur les organes de végétation dans le genre Carex. pp. 213 7 plates. Genève 1891.